

Research, Engineering & Development (R,E&D) Advisory Committee

Recommendations on Committee Guidance for FY 2001 and Meeting Minutes

September 15-16, 1998

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Meeting Minutes of the Federal Aviation Administration Research, Engineering and Development Advisory Committee September 15 & 16, 1998

On September 15 and 16, 1998, the Federal Aviation Administration (FAA) Research, Engineering and Development (R, E&D) Advisory Committee held a meeting at the Holiday Inn Rosslyn Westpark Hotel in Arlington, Virginia, Attachments 1 and 2 provide the meeting agenda and meeting attendance, respectively.

DAY ONE - September 15, 1998

Welcome and Introductory Remarks

Dr. Herman Rediess, Executive Director and Designated Federal Official of the Committee, read the public meeting notice.

Mr. Ralph Eschenbach, Chairman of the Committee, welcomed the attendees and introduced two new members: Lt. Gen. Spence Armstrong, Associate Administrator for Aeronautics and Space Technology, NASA and Mr. Neil Planzer, Executive Director, DoD Policy Board on Federal Aviation. He recognized two Members leaving the Committee, Capt. Pat Andrews and Mr. Michael Rioux and thanked them for their valuable contributions to many Committee efforts. Mr. Eschenbach also bid farewell to Dr. Clyde Miller who will be leaving the Office of Aviation Research to work with Charlie Keegan on Free Flight Phase I.

Mr. Steve Zaidman, Associate Administrator for Research and Acquisitions, welcomed the Members and provided brief opening remarks. He reviewed the results from both the House and the Senate budget deliberations. These preliminary results included a large operations budget shortfall, a facilities and equipment (F&E) budget shortfall of \$700 million, and a transfer of the air traffic management (ATS) efforts from the R,E&D budget into F&E. The budget shortfalls would impact schedules. Mr. Zaidman went on to discuss FAA's research and development (R&D) program. Users are looking for short-term goals, and the R,E&D budget should be applied to short-term goals. FAA is working to form a better cooperative relationship with NASA. FAA wants to re-evaluate any overlapping efforts between FAA and NASA and assign responsibility for the effort to one group. Finally, Mr. Zaidman expressed the interest of Administrator Garvey and Mr. Belger, Acting Deputy Administrator, in the Committee. The Members' advice and counsel is greatly appreciated and is valued by the Administrator when making difficult decisions.

FAA R&D Program Objectives

Dr. Herman Rediess, Director for Aviation Research, presented the objectives of the FAA R&D Program. He stated the overall objective is to ensure a safe, secure, efficient, environmentally acceptable, global aerospace system. In addition, there is a responsibility to establish a partnership with industry. The partnership must be formed at the initial stages of the program to allow industry to participate in the formulation of the requirements and operational concept. Also important is a responsibility to provide benefits to the traveling public. The current R,E&D budget is \$200 million, which includes salaries. Resources are low, so R,E&D investment decisions are important. The R,E&D Advisory Committee can help FAA by providing recommendations on and priorities for R,E&D investments.

FAA/NASA Research Cooperation

Lt. General Spence Armstrong, NASA Associate Administrator for Aerospace and Space Transportation Technology, addressed the Committee regarding FAA and NASA cooperative research efforts.

NASA's goals are focused around three pillars including: (1) Global Civil Aviation,

(2) Revolutionary Technology and (3) Access to space. NASA is planning to hold a conference with the community on October 9th in Cleveland, Ohio. The purpose is to discuss 10 goals, which support these pillars, including:

- Reduce Accident Rates, 10x
- Increase System Throughput, 3x
- Reduce Cost of Air Travel by 50%
- Reduce Emissions, 5x
- Reduce Noise, 5x
- Reduce Transoceanic Travel Time by 50%
- Invigorate GA 20K Units Annually
- Cut Development Cycle Time in Half
- Reduce Launch Cost, to LEO, 100x by 2020 (current launch cost \$10,000 per pound)
- Reduce In-Space Transport Cost, 10x by 2015

NASA's budget is \$13 billion, which does not include salaries. The space shuttle program budget is about half of the total NASA budget. The air traffic budget is about \$500 million, which includes salaries.

Strong partnerships will be able to see these goals to fruition. There are roadmaps to accomplish these with the help of

partners such as FAA. Congress has been telling NASA that it needs to have better cooperation and partnerships.

Meeting Process and Objectives & Update on R&D Objectives

Dr. Clyde Miller, FAA Program Director for Research, discussed the roles of the Committee. These include: (1) providing investment guidance (Is FAA doing the right thing?), (2) conducting program reviews (Is FAA doing things right?),

(3) reviewing R,E&D program management, and (4) performing ad hoc studies.

Dr. Miller also provided an update on the House and the Senate changes to the president's fiscal year 1999 budget for R, E&D. For Flight 2000, \$90 million was requested, but neither the House nor the Senate funded it; however, the Senate provided \$4 million for planning purposes. About \$45 million of air traffic services programs were moved from R, E&D to F&E. There also were a number of congressional

"set-asides" of funding, that is, funding that is earmarked for particular uses. The presidential budget request for R,E&D in FY 1999 was about \$200 million. With the shift of ATS programs to F&E, the final budget may be around \$155 million.

Update on Runway Incursion Subcommittee

The Runway Incursion Subcommittee was established as an ad hoc Subcommittee in September 1997 to develop recommended runway incursion preventive actions that would contribute to developing a runway incursion action plan. Mr. Bruce Landsberg chaired the subcommittee. The Committee approved the subcommittee's report in January 1998 and submitted it to FAA.

Mr. Landsberg provided an update on subcommittee activities. The subcommittee met on August 27th. Shortly thereafter, FAA changed its runway incursion program manager for the third time in less than a year. Furthermore, FAA personnel estimate that the recommended runway incursion program will cost \$3.2M; however, FAA has informed Mr. Landsberg that no funding is allocated for the program.

Update on FAA/EUROCONTROL R&D Committee Meeting Held in Germany

Mr. Paul Drouilhet represented the R,E&D Advisory Committee at a recent FAA/Eurocontrol R&D Committee meeting, which was held in Frankfurt, Germany.

Mr. Drouilhet presented information to the Committee on the meeting.

The Eurocontrol R&D committee meets twice a year and also conducts teleconferences. Dr. Jan Brecht-Clark for FAA and Mr. Phillip Escritt of Eurocontrol co-chair the committee. Members include FAA, Eurocontrol and national administrations. The committee meets semi-annually, and the next meeting is in Orlando in December. There are eight action plans for ATS-related R&D. Each action plan has an FAA and Eurocontrol lead, and the purpose of the committee meetings is to review these plans. Mr. Drouilhet observed that there is substantial ATM R&D occurring in Europe; much effort is dedicated to coordination; European Commission and Eurocontrol activities are well coordinated; and there is information exchange between the US and Eurocontrol.

Mr. Drouilhet recommended that the ATS Subcommittee become familiar with European efforts in order to advise FAA on opportunities and priorities. To do this, the subcommittee should participate in FAA/Eurocontrol R&D Committee meetings, review relevant European documents, and visit appropriate European facilities.

FAA Response Air Traffic Services (ATS) Subcommittee Report

The ATS Subcommittee is a standing subcommittee, which was established in January 1997 to provide recommendations to the FAA on its proposed R,E&D investment portfolio and to conduct annual reviews of FAA's research and development program. Ms. Nancy Price chairs the subcommittee. On November 6-7, 1997, the subcommittee prepared a report, which reviewed the Flight 2000 program, NAS operational concept, and NAS architecture. The Committee approved the report in January 1998 and submitted it to FAA on February 12.

Mr. Joseph Pino, Target Area Team (TAT) lead for ATS from the Air Traffic Systems Requirements Office, provided FAA's response to the Committee's recommendations in this report. Attachment 3 provides FAA's response to these recommendations.

Ms. Nancy Price questioned any delay in the deployment of Flight 2000, as several parts of it can be deployed now. Ms. Price also reiterated the need to tie the R&D program to the NAS architecture.

Update on Free Flight Phase 1

Mr. Charles Keegan, FAA Free Flight Phase 1 Director, presented an update of Free Flight. The Free Flight program office was established in July with a direct reporting line to the Administrator as a result of recommendations from the NAS Modernization Task Force and RTCA. The goal of Free Flight is to provide near-term delivery of six highly beneficial programs: traffic management advisor (TMA); passive final approach spacing tool (pFAST); controller/pilot data link; user-request evaluation tool (URET); collaborative decision making (CDM); and surface movement advisory (SMA).

Mr. Keegan discussed thirteen possible implementation sites and the program schedule. Initial delivery is in 2002. Implementation plans should be available by early 1999.

Update on Flight 2000

Mr. James Rogers, from the Office of Communications, Navigation and Surveillance, provided an update on the Flight 2000 program. The Administrator asked the RTCA Free Flight Steering Committee to re-evaluate the program. RTCA achieved industry consensus for a proposal that RTCA develop a plan for the program. There are several changes. The new name assigned to the program is Safe Flight 21. The Ohio Valley along with Alaska will serve as the demonstration sites. The program will be managed by Mr. Richard Lay under the Surveillance Integrated Product Team (IPT) in AND-400. FAA personnel and RTCA members are working to complete the program plan for this effort in order to brief the Free Flight Steering Committee (RTCA) on December 10th.

The Committee expressed a concern that the program appears to be starting over, as if the last year of work on the program would be tossed aside and would not be used.

FY 2001 R,E&D Investment Process

Mr. Randy Stevens, from the Office of Aviation Research, Research Division, provided an overview of the FY 2001 R, E&D investment process. The R,E&D Advisory Committee involvement in the process is the same as it was last year. In September, the Committee provides investment guidance to be used by FAA when preparing its R,E&D investment portfolios. In February to March, the standing subcommittees review their respective target area team's (TAT's) proposed investment portfolio and provide comment on it. In April, the standing subcommittee chairs will present their recommendations to the Committee, and the Committee will make its final recommendations to FAA.

Subcommittee Guidance on FY 2001

Each year in September, the Committee provides recommendations on how FAA should invest its R,E&D funds. FAA uses these recommendations to prepare its investment portfolios. Each standing subcommittee chair presented the recommendations from his or her subcommittee to the Committee. These recommendations are provided by Attachment 4. The standing subcommittee chairs, who presented the recommendations, included the following:

Air Traffic Services Ms. Nancy Price

Airport Technology Ms. Angela Gittens

Aircraft Safety Mr. Robert Doll

Aviation Security Dr. Dennis McLaughlin (acting)

Human Factors Dr. John Lauber

Environment & Energy Dr. Wesley Harris

DAY TWO - September 16, 1998

Mr. Eschenbach convened the meeting at 8:30 a.m. and Dr. Herm Rediess reiterated the terms of the public meeting announcement.

Committee Discussion on Final Guidance for FY 2001

The Committee continued deliberations on the standing subcommittee's recommendations and discussed the priorities in each area and any areas where funding might be reduced. The following provides the results of these discussions.

- FAA has made significant progress in developing and documenting plans for air traffic management (ATM) modernization including the National Airspace System (NAS) Architecture, Concept of Operations for 2005, and Joint FAA/NASA ATM R&D Plan. However, the relationships and interdependencies between these plans are not clear, and none present a roadmap for an evolving operational capability with quantitative user benefits. FAA should develop a plan for ATM modernization expressed in terms of quantitative goals for evolving operational capabilities and user benefits. The Concept of Operations and the NAS Architecture should be tied to this ATM Modernization Plan. Furthermore, the R&D plans should in turn be tied to the Concept of Operations and NAS Architecture and should explain what R&D needs to be done and by when in order to support these plans.
- FAA's Airport Pavement Program is an important program that is providing critical information for establishing pavement design standards that will affect every nation that is a member of the International Civil Aviation Organization (ICAO). Increasing pavement life by as little as 10 percent as a result of pavement research would yield cost savings of \$200 million per year. The Committee recommends that FAA continue to fund this important effort.
- The Committee recommends that FAA continue to concentrate R&D efforts in FY 2001 and beyond on the issues arising from aging aircraft fleets. New technology aircraft will exhibit different problems as they age. In conjunction with advancing inspection and maintenance technologies, FAA must continue to develop the safety database and related analyses techniques that will generate leading indicators of potential safety problems. The feedback from this analysis must be incorporated into operating regulations and certification standards in a timely manner so as to prevent new accident modes.
- The Committee recommends that programs dedicated to prevention and containment of fire, both on board and post crash, continue to receive the highest priority for funding. As recent events demonstrate, ignition sources will be present on aircraft in their electrical systems, in luggage, or in cargo containers. Every effort must continue toward the elimination of ignition sources. The containment of a fire before an aircraft is lost either on the ground or in the air, must continue as a

top priority into FY 2001 and beyond. The Committee feels that NASA could and should invest more money in long-term fire research.

- Current FAA environmental research is a limited effort which, if not strengthened adequately within the agency, will eventually restrict the growth of the aviation system. An increased level of focused strategic research is needed to (1) advance abatement technology, (2) identify appropriate environmental standards, and (3) develop environmental assessment computer models. The Committee recommends that FAA give priority to increasing environmental assessment capability in the areas of engine emission certification as well as model development for mandated requirements.
- The Committee recommends that FAA reconsider diverting 20 percent of its planned investments in aviation security to high priority requirements for air traffic services' research. We do not feel that the money is being misused, but that it would be more in the National interest to support NAS modernization and the transition to free flight. In the past, FAA has disagreed with this recommendation citing the results of the Gore Commission and the Nation's concern over security. The Committee recommends that FAA reconsider it at this time.

Update on GA and Vertical Flight Subcommittee

The Subcommittee on General Aviation and Vertical Flight is an ad hoc Subcommittee established in April 1997 to investigate general aviation and vertical flight issues.

Mr. John Zugschwert and Mr. John Olcott co-chair the subcommittee.

Mr. Zugschwert provided an update on the Subcommittee's status. On behalf of the subcommittee, Mr. Zugschwert requested that the Committee extend the terms of reference so that work could be completed. Its current terms of reference expired in September. The Committee agreed to review and vote on an extension to the terms of reference at the January 1999 meeting. Mr. Zugschwert agreed to prepare the terms of reference and present it to the Committee in January.

R,E&D Advisory Committee Process Discussion

Dr. Clyde Miller, Program Director Office of Research, provided a proposal for the

April 1999 Committee meeting. The purpose of the April meeting is for the Committee to generate its final advice on FAA's proposed investment portfolio. In the past meetings, each TAT has presented its planned portfolio to the Committee as a whole. The proposal is that each subcommittee meet with its TAT the day before the Committee meeting to receive the final presentation of the TAT's portfolio; then, the subcommittees refine their recommendations for presentation to the full Committee the next day. In this scenario, the TATs would not present to the full Committee. FAA would provide a brief overview at the beginning of the Committee meeting; then, the subcommittee chairs would present their findings. The Committee would deliberate on its final recommendations within one day. The Committee endorsed the proposal for the April 1999 meeting.

Additional recommendations by the Committee included:

- Promote FAA successes to the Committee.
- Provide high-level rather than detailed presentations to the Committee.
- Streamline the RPD presentations and edit them before presenting them.
- Provide demonstrations at the beginning of the meeting.

Dr. Herman Rediess welcomed all Members to provide additional recommendations on (1) how to improve the process,

- (2) how to conduct the Committee meetings, and
- (3) FAA’s use of the Committee. Members were asked to provide this information to him before the next meeting.

Closing

Before Mr. Eschenbach closed the meeting, he notified members of the next meeting on January 20 and 21, 1999. He announced the other 1999 meeting dates as April 20-21 (where April 20 was for subcommittee meetings and April 21 for the full Committee meeting) and September 14-15.

Mr. Eschenbach thanked the Members for their participation, and adjourned the meeting.

Attachment 1

Research, Engineering & Development (R,E&D) Advisory Committee

Holiday Inn Rosslyn Westpark Hotel

1900 North Fort Myer Drive, Arlington, VA 22209

(703) 807-2000 Fax: (703) 522-7480

September 15-16, 1998

Agenda

Tuesday, September 15

| | | |
|-------------------|---|---------------------------------|
| 9:00 am-9:15 am | Welcome and Introductory Remarks | Mr. Ralph Eschenbach, Chair |
| | | Mr. Monte Belger, FAA |
| 9:15 am-9:45am | Perspective on Research and Acquisition | Mr. Steve Zaidman, FAA |
| 9:45 am-10:15 am | FAA R&D Program Objectives | Dr. Herman Rediess, FAA |
| 10:15 am | Break | |
| 10:30 am-11:00 am | FAA/NASA Research Cooperation | Lt. Gen. Spence Armstrong, NASA |

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|-------------------|---|---------------------------------------|
| 11:00 am-11:30 am | Meeting Process and Objectives & Update on R&D Investments | Dr. Clyde Miller, FAA |
| 11:30 am-11:45 | Update on Runway Incursion Subcommittee | Mr. Bruce Landsberg |
| 11:45 am-12:00 | Update on FAA/EUROCONTROL R&D Committee Mtg. Held in Germany | Mr. Paul Drouilhet |
| 12:00 noon | LUNCH | |
| 1:00 pm-1:30 pm | FAA Response to ATS Report | Mr. Joseph Pino, FAA |
| 1:30 pm-2:00 pm | Update on Free Flight Phase 1 | Mr. Charles Keegan, FAA |
| 2:00-pm-2:30 pm | Update on Flight 2000 | Mr. James Rogers, FAA |
| 2:30 pm-2:45 pm | FY 2001 R,E&D Investment Process | Mr. Randy Stevens, FAA |
| 3:00 pm | BREAK | |
| | Subcommittee Guidance on FY 2001 | |
| 3:00 pm-3:20 pm | Subcmte. on ATS | Ms. Nancy Price |
| 3:20 pm-3:40 pm | Subcmte. on Airport Tech. | Ms. Angela Gittens |
| 3:40 pm-4:00 pm | Subcmte. on Aircraft Safety | Mr. Robert Doll |
| 4:00 pm-4:20 pm | Subcmte. on Security | Dr. Dennis McLaughlin (Acting) |
| 4:20 pm-4:40 pm | Subcmte. on Human Factors | Dr. John Lauber & Hon. Susan Coughlin |

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|-----------------|---------------------------|-------------------|
| 4:40 pm-5:00 pm | Subcmte. on Env. & Energy | Dr. Wesley Harris |
| 5:00 pm | Adjourn | |

Wednesday, September 16

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| 8:30 am | Convene Meeting | Mr. Ralph Eschenbach, Chair |
| | | Dr. Herm Rediess, FAA |

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| 8:30 am-10:00 am | Committee Discussion on Final Guidance for FY 2001 | Mr. Ralph Eschenbach, Chair |
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|-------------------|--|-----------------------------|
| 10:00 am-10:30 am | Committee Report on Guidance for FY 2001 | Mr. Ralph Eschenbach, Chair |
| | | Mr. Monte Belger, FAA |
| | | Mr. Steve Zaidman, FAA |

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| 10:30 am-10:45 am | Update on GA & Vertical Flight Subcommittee | Mr. John Zugschwert |
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| 10:45 am | BREAK | |
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| 11:00 am | REDAC Process Discussion | Dr. Clyde Miller, FAA |
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| 12:00 noon | Meeting Adjourned | |
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Attachment 2

Research, Engineering & Development (R,E&D) Advisory Committee

September 15-16, 1998

Attendance

| | | |
|----------------------------|-------------------------|-------------------------|
| Mr. Ralph Eschenbach | Mr. Spence Armstrong | Mr. Richard Bustelo |
| Mr. Viggo Butler | Mr. Robert Doll | Mr. Paul Drouilhet |
| Mr. Paul Fiduccia | Dr. Aaron Gellman | Ms. Angela Gittens |
| Dr. Wesley Harris | Dr. Robert Helmreich | Ms. Margaret Jenny |
| Mr. Bruce Landsberg | Dr. John Lauber | Dr. Dennis McLaughlin |
| Mr. Neil Planzer | Ms. Nancy Price | Mr. Edward Stimpson |
| Stan Grubaugh, FAA | Ed Spitzer, Volpe | Jan Brecht-Clark, FAA |
| Joe Dinsmore, FAA | Lauren Grace, FAA | John Fielding, Raytheon |
| Richard John, Volpe | Sharon Darnell, FAA | Hugh Bergeron, FAA |
| Charles Beam, FAA | Al Albrecht | Ellis McElroy, FAA |
| Charles Huettner, FAA/NASA | Lee Olson, FAA | George Marania, FAA |
| Dot Buckanin, FAA | Dennis Kershner, JPL | Maureen Pettitt, FAA |
| Barry Romney, FAA | John Hallinan, FAA | Ambrose Hauser, GE |
| Mike Gallivan, FAA | Warren Fellner, FAA | Virgenia Embrey, FAA |
| Dennis Filler, FAA | Carl Rappaport, FAA | David Michael, Battelle |
| Bill Edmunds, ALPA | Kim Crook, ATCA | Richard Danz, ATMS |
| Roy Hurlbut, Boeing | Ray Godman, TRW | Michael Basehore, FAA |
| Chuck Friesenhahn, FAA | Paul Hawkins, FAA | Anne Harlan, FAA |
| Charles Fluett, FAA | Robert DeRoode, Gallium | Keith Murray, SETA |
| Tom Proeschel, FAA | Bob Stanzione, FAA | Bill Thompson, SETA |
| David Smith, FAA | Bob Schwab, Boeing | Chuck Ruehle, FAA |

| | | |
|----------------------------|-------------------------|-------------------------|
| Richard Young, FAA | Sieg Poritzky, ATMS | Jim Wichmann, MIT |
| Nick Stoer, Stoer & Assoc. | Robert Wright, FAA | Norman Simenson, FAA |
| Randy Stevens, FAA | Clyde Miller, FAA | B.J. Palch, AET Corp. |
| Raymond LaFrey, MIT | Jim White, FAA | Herm Rediess, FAA |
| Joseph Pino, FAA | Rudy Ruana, Jeppesen | Victor Ilenda, JPL |
| George Skaliotis, Volpe | Bennie Sanford, FAA | William Voss, FAA |
| Theodore Davies, FAA | Paul Polski, FAA | Bruce Singer, FAA |
| Nancy Lane, FAA | Chris Seher, FAA | Lee Tucker, Booz Allen |
| Frank Petroski, MITRE | Rich Jung, Anteon Corp. | Calvin Mitchell, FAA |
| Cheryl Veney, FAA | Fred Snyder, FAA | Brian Legan, Booz Allen |
| Walter Hett, WHA | Russ Benson, Boeing | Tom Connor, FAA |
| Al Babbitt, TRW | Fenton Carey, DOT | Tammy Jones, FAA |
| Geoff Mumford, APA | Joseph McCormick | Terry Kraus, FAA |
| David Johnson | John Wiley, FAA | Frank Soloninka, FAA |
| Antony Vaudrey, British | George Donohue, George | John Zugschwert, |
| Embassy | Mason University | TEXTRON |
| Toni Trani, NEXTOR | Armen Sahagian, FAA | Paul Murphy, TRW |
| JimRogers, FAA | Betty Ann Kane, NOISE | Jim Herbert, SETA |
| Fred Roder, FAA | Patrick Lewis, FAA | Kenneth Cobb, TRW |
| Joe Sinnott, MITRE | Nan Shellabarger, FAA | Mary Barboza, FAA |
| Bob Voss, FAA | June Lidder, SETA | Regina Porzio, Crown |
| Carole Schmidt, Crown | Gloria Dunderman, Crown | Lorraine Iritano, SRM |

Attachment 3

Federal Aviation Administration's (FAA) Response to Recommendations
from the Research, Engineering and Development (R,E&D) Advisory Committee's
"Report & Minutes of the Subcommittee on Air Traffic Services,"

Recommendation #1: In its program for ATM modernization, the FAA should give highest priority to increasing capacity, reducing delay, and improving safety. Allocation of resources should be in accord with this high priority.

Response: We concur with the Subcommittee's recommendation to give the highest priority to increasing capacity, reducing delays, and improving safety. The Air Traffic Services (ATS) Target Area Team (TAT) proposed to the R, E&D Advisory Committee, Tier One fiscal year (FY) 2000 funding allocations for the Aviation System Capacity Research Project Description (RPD), Aviation Weather RPD, and Tower/Surface Automation RPD. These research programs are expected to increase the capacity of the U.S. aviation system to meet customer demand for aviation services, allow more flexibility in the use of resources for National Airspace System (NAS) users, and reduce weather-related accidents and incidents. In addition, the Runway Incursion Reduction, Separation Standards, and Aeronautical Data Link RPD's have been proposed for Tier One funding for FY 2000 by the ATS TAT.

Recommendation #2: The FAA should refocus Flight 2000 on the highest priority issues --safety, capacity, and delay in capacity-constrained airspace -- with emphasis on total system integration.

Response: The concept for a program like Flight 2000 has evolved over several years, based on a realization that the challenge of the NAS modernization is in achieving new flight capabilities, not just installing new ground-based automation equipment. Flight 2000 will accomplish a manageable cross-section of total system integration, and validate the resulting flight capabilities in a real-world operational environment. The program is being refocused with greater emphasis on reducing the technical, operational, and institutional risks of NAS modernization. Communication, navigation, and surveillance (CNS) systems must be integrated, aircraft compatibly equipped, and operational procedures developed, for controllers and pilots to assess the benefits of advanced technology and thereby reduce the risks associated with modernizing the NAS.

Applying the CNS flight capabilities of Flight 2000 at higher density contiguous United States (CONUS) sites was originally conceived as an activity to transition the results of Flight 2000 to NAS-wide modernization. Based on a recent recommendation by the Air Traffic Services Subcommittee, Flight 2000 intends to add a CONUS site as an integral part of the program. We are currently analyzing candidate sites, based upon traffic density, prevalence of air carrier operations, numbers of aircraft equipped with Flight 2000 avionics, necessary CNS and air traffic management (ATM) ground equipment, and suitability of airspace. Once this work is complete, a set of criteria will be forwarded to the RTCA Free Flight Steering Committee for industry review and concurrence on a final site. The Select Committee has committed to providing its recommendations to the FAA by August.

The flight capabilities resulting from Flight 2000 development also will offer vastly improved pilot and controller situational awareness and the potential for collaborative decisions between pilots and controllers. Eventually, and under carefully managed situations, controllers may authorize pilots to maintain self-separation in instrument conditions similar to the visual separation instructions controllers routinely issue to pilots today. In such an environment, controllers will be able to devote greater attention to managing the overall traffic situation to accommodate user-preferred trajectories. The results will be more efficient traffic flow without compromising safety.

For pilots to maintain instrument separation comparable to today's visual separation, both controllers and pilots will need a reliable, accurate, and consistent depiction of traffic, as well as an ability to identify positively specific aircraft. By integrating advanced CNS capabilities in a real-world environment, Flight 2000 will demonstrate and validate the feasibility and potential benefits of collaborative decisionmaking and pilot instrument separation responsibility. These new flight procedures will then permit controllers to employ fully the sophisticated ATM tools that promise substantial NAS capacity improvements for the future.

Recommendation #3: To enhance safety, the FAA should increase the priority for deploying the ground systems which transmit weather information to the cockpit, and should continue to support the development of affordable avionics for the display of weather and hazardous terrain.

Response: The FAA is committed to providing Flight Information Services (FIS) to pilots and has issued a policy statement which includes delivery of weather products to the cockpit. This policy statement was developed in conjunction with the general aviation user communities and industry. The policy enables the FAA and industry to partner in providing the services thus expediting the implementation of FIS. R,E&D activities necessary to develop standards and guidance materials for the implementation of FIS are contained within the Aeronautical Data Link R,E&D program and Flight 2000. Flight 2000 is a limited, real-world demonstration and validation of advanced operational capabilities. It is an R,E&D program focused on integrating technologies, developing procedures, and mitigating risks prior to a full-scale NAS deployment. As such, Flight 2000 is a key near-term learning effort in applying new CNS technology to the operational NAS. Critical decisions regarding subsequent Facilities & Equipment (F&E) programs to implement these technologies throughout the NAS will be heavily dependent on the validation results of Flight 2000. Until these results are known, there is no basis for an investment decision to deploy the CNS systems Flight 2000 addresses.

Recommendation #4: The FAA should develop a plan for ATM modernization expressed in terms of quantitatively-defined goals for evolving operational capabilities and user benefits. The concept of operations and the architecture should be tied to this ATM Modernization Plan, and the R&D plans should in turn be tied to the concept of operations and the architecture (i.e., what R&D must be done, and when, to support these plans?).

Response: The FAA plans to expand both the concept of operations and the architecture to develop this plan for modernization. The architecture will be expanded to include identification and milestone planning for procedures and certification. We hope that by including these details, the architecture and its appendices will become the planning document for modernization.

The current architecture is logical based on the high-level concept of operations. The process for deriving a technical architecture is based on a feedback loop with the concept of operations. As the detail is added to the concept, it will increase the specificity by which the initial requirements for a capability can be defined. Where the concept is not clear or sufficiently detailed for deriving requirements, the push will be from the technical architecture to the concept developers to provide a basis for requirement definition.

The FY 2000 R,E&D plan used the architecture and the concept to validate current activities and identify needed R, E&D shortfalls. Many of the needs expressed in the RPD's beyond the current FY 1998 core were first identified in the process of rationalizing concept and architecture with R,E&D. The proposals and initial assignment to the funding tiers were based on the proposed architectural schedule for fielding capabilities. As the concept is developed and the architecture refined, the R,E&D requirements will also be refined and more closely tied to the modernization schedule.

It is clear that all capabilities and proposed paths to meeting the capabilities' shortfalls are not equal. Clear definition of the operational improvement sought and an understanding of the current baseline performance are required to decide which capabilities to pursue and which solutions are tenable. In a concurrent and related activity, operational analysis will be conducted and performance measures will be developed to determine which steps are achievable and affordable. The activities pioneered by the System Capacity organization to define operational performance and value will be expanded as part of the continuing efforts of System Capacity, and performance definition and measurement is a key step in concept validation.

The clear articulation of the operational changes to be made and the method by which they will be measured will allow the FAA to develop clear performance baselines for capabilities as opposed to constituent systems. The baseline will allow tracking of all aspects to the delivery of new capabilities, such as systems, procedures, training, and airspace adaptation. The ARA performance plan goal 6 is the initial step in tracking capabilities in this fashion.

Recommendation #5: The Administrator should make sure that she is aware of the recommendations of the R,E&D Advisory Committee and other existing advisory committees, possibly by direct representation of these committees on the NAS Modernization Task Force.

Response: The FAA established the NAS Modernization Task Force to advise the Administrator on the next steps necessary to NAS Modernization. The task force began its work in November 1997 and held its last meeting in January of this year, having completed its requested task. It recommended that the FAA concentrate its modernization efforts on a subset of the proposed NAS Architecture and delay work on other parts until this first subset was accomplished. The recommended subset, labeled Free Flight Phase 1 (FFP1), consists of the following systems and controller tools: Passive Final Approach Spacing Tool; Traffic Management Advisory Single Center; Controller Pilot Data Link; User Request Evaluation Tool; Collaborative Decisionmaking with Airline Operations Centers; and Surface Movement Advisor.

Subsequently, the FAA has requested the RTCA Free Flight Steering Committee and its Free Flight Select Committee to provide oversight of the FAA's efforts in accomplishing the FFP1 tasks. Some members of the R,E&D Advisory Committee and its subcommittees are also members of the RTCA Free Flight Steering Committee and Select Committee. This dual membership should provide the recommended R,E&D Advisory Committee representation on committees that advise the Administrator on NAS Modernization.

Attachment 4

Recommendations for FY 2001

Chair: Ms. Nancy V. Price

Subcommittee on Air Traffic Services

RPD Process Recommendations:

1. Quantify results and benefits from previous year budget (i.e., FY 98 results).
2. Determine cost benefits and determine metrics.
3. Funding Profile - currently presented three tiers, change to show only funding level which FAA expects.
4. Funding reality needs to be applied to fund those "RPDs" that are highest priority and

stop trying to fund all ATS research projects.

5. Shorten to succinct summary 2-3 pages.

FY 2001 Recommendations:

1. All RPDs should map to the Baseline Plan (which includes the architecture, concept of operations, transitions, Free Flight Phase I, Safe Flight 21, etc.) and include result of cost benefit analysis.
2. NASA is a significant partner with the FAA in ATM R&D; the Subcommittee recognizes the importance of coordinating the research between the two agencies. To ensure adequate review of the ATM research, the ATS Subcommittee will include in its review all ATS R&D activities (FAA, including CAASD and F&E, and NASA).
3. The FAA should jointly (with the ATS Subcommittee) identify three or four areas for the Subcommittee to focus on. The selections should be made in early fall to allow subpanels to be formed and meet with the appropriate agencies (FAA, CAADS, NASA, industry, etc).

The above recommendations were highlighted in the R,E&D Advisory Committee on September 15, 1998.

These recommendations should be evaluated in light of those submitted on November 6-7, 1997, and the Breakout Report

on April 23, 1998 and the Standing Subcommittee Guidance as documented in the May 28, 1998 letter to Honorable Jane F. Garvey, as they are still applicable.

Other Issues

1. The FAA response to the ATS Subcommittee recommendation on giving the highest priority to increasing capacity, reducing delays and improving safety was inadequate. These are pacing items.
2. Where are the modernization activities? Are they still an integral part of the Baseline Plan, Architecture, concept of operations, etc. Is there a reasonable schedule to achieve? Where is the focus on this critical aspect of the ATM future.
3. NASA and FAA have developed a good joint plan, AATT. The Subcommittee would like to review how will the research being performed is aligned with this plan.
4. The plan for Safe Flight 21 was totally unsatisfactory. A lot of time and effort on the part of this Subcommittee was expanded to work with Dave Tuttle on Flight 2000. To see this work abandoned is irresponsible.

Attachment 4 (Continued)

Recommendations for FY 2001

Chair: Ms. Angela Gittens

Subcommittee on Airports

The FAA's Airport Pavement Program is a truly international program that is providing critical information for establishing pavement design standards that will affect every nation that is a member of the International Civil Aviation Organization (ICAO). The completion of the National Airport Pavement Test machine is the beginning of an era that will change the way airport pavements are designed; crucial information obtained from the machine will provide more efficient and economical designs. Maximum use must be obtained from the Pavement Test facility to fully support the large investment in its construction. Testing pavements to destruction requires a commitment to reconstruct pavement test sections every 18 months. Sufficient funds must be provided to fully fund the pavement reconstruction. Pavement funding is required for the next several years to develop and implement new design procedures that have worldwide acceptance and represent the varied soil conditions throughout the world.

The FAA must provide continuing leadership in wildlife research efforts. Partnerships with the Department of Agriculture and academia should be continued for conducting basic and applied research on wildlife hazards.

The FAA must increase its research efforts in finding solutions for the problems associated with the post-crash rescue and fire fighting of the New Large Aircraft - the "double decker" aircraft to be introduced to the fleet soon.

Research must continue in airport lighting technology and airport marking systems to improve low visibility operations and rescue runway incursions.

Increased emphasis must be placed in airport planning and design. Updated guidance and advisory circulars need to be developed to assess the impact of new large airplanes on airport infrastructure and airport layout.

With severe reductions in the airport technology budget in FY 96, 97, & 98, and limitations in the budget for FY 99 and

2000, it is strongly recommended that the airport technology budget target for FY 2001 be raised to a level of \$10,000,000.00.

It must be recognized that the research in the airport technology program has provided large returns on investment to date, and has a potential of providing even larger returns in the very near future. The program execution has resulted in increased public safety, improved relations with FAA's external partners, and substantial cost savings for the agency and the aviation community.

Cost Benefit Assessment

Pavement RPD's

Approximately \$2 billion is spent annually on constructing, rehabilitating, and maintaining airport pavements by federal, state, and local governments and by airport operators, whereas about \$4 million is spent on research. Increasing the pavement life by as little as 10% through research would result in cost avoidance of \$200 million per year. This does not count the delay cost reduction generated by keeping runways and airfields in service for longer period.

Other High Priority RPD's

Installation of the Soft Ground Arresting System at JFK International Airport, proposed installation of a similar system at LaGuardia Airport, establishment of the infra-red deicing system at Rheinlander Airport, and the development and use of Drivers Enhanced Vision System for airport rescue and fire fighting efforts are recent examples of the successful implementation of safety products.

The airport technology program, if funded at \$10 million in FY 2001, is still a relatively small amount of the total R, E&D budget but supports capacity, safety, and efficiency.

| 1996 \$ in 000'S (costs include 5 yr RED and 20 year implementation) | | | | | |
|---|-------------------|------------|----------------|----------------|------------|
| | BENEFITS | | COSTS | | ROI |
| RPD # | USER | FAA | USER | FAA | |
| | | | | | |
| 148 Traction | 12,660,954 | - | 275,000 | 826,750 | 11 |
| | | | | | |
| 150 Wildlife | 216,700 | - | - | 1,327 | 163 |
| | | | | | |
| 152 ARFF | 162,000 | - | - | 4,750 | 34 |
| | | | | | |
| TOTALS | 13,039,654 | - | 275,000 | 832,827 | 12 |

Recommendations for FY 2001

Chairman: Mr. Robert Doll

Subcommittee on Aircraft Safety

The Subcommittee for Aircraft Safety met in Oklahoma City on August 11-13, 1998. We were hosted by CAMI and enjoyed the hospitality of the FAA team there. Our meetings were greatly enhanced by an extended tour of the CAMI facilities and the attendance of six of the FAA's National Resource Specialists who deal with aircraft safety issues.

In looking ahead to FY 2001, we feel that the R,E&D programs for aircraft safety are reasonably balanced between accident prevention and accident mitigation. However, we feel that, in light of the statistical problems the industry faces as the frequency of aircraft operations continue to increase, the choice for the allocation of scarce dollar resources between prevention and mitigation must be biased in favor of prevention.

As the industry looks ahead to FY 2001, presently unknown hazards will arise as

new technology aircraft mature in service. R,E&D efforts must attempt to look forward to those problems having the highest potential to produce an accident rather than react to accidents after the fact.

The emphasis of aging aircraft research effort to date has been directed toward understanding the potential safety impact of aging structures. Research efforts should be introduced by FY 2001 (or sooner) to understand potential safety hazards arising from aging aircraft systems.

Fire Prevention and Containment

The highest priority must continue for the programs dedicated to prevention and containment of fire both on board and post crash. As recent events demonstrate, ignition sources will be present on aircraft in their electrical systems, in luggage, or in cargo containers. Every effort must continue toward the elimination of ignition sources. The containment of a fire before an aircraft is lost either on the ground or in the air, must continue as a top priority into FY 2001 and beyond. SAS feels NASA could and should invest more money in long-term fire research.

Electro Magnetic Interference

The committee discussed electromagnetic interference and the industry's lack of basic knowledge of the interaction of personal electronic devices used in the cabin with the systems that control modern electronic aircraft. There is no funding in the current budget through FY 2000 to support FAA inquiry into the area of devices in the cabin that emit RF energy. We believe that in FY 2001 funding should be directed to understand the impact of EMI, first to disprove any invalid theories that prevent the use of personal RF emitting devices on aircraft and second, to understand what real hazards to safe flight exist from the use of these devices on board aircraft. EMI should be better understood before a serious accident happens.

Safety Databases

During our meetings this year, we have developed a better understanding of the R,E&D efforts to develop

industry performance information and to create a data base that might help in identifying leading indicators of potential safety problems. The ATOS program that has incorporated SPAS has been presented to the industry. It appears that cooperative development efforts have begun with the ATA. Funds have been allocated to these efforts through FY 2000. We believe that these programs should phase out of R,E&D funding in the years after FY 2000 as they should be considered primarily operational programs by that time. Efforts should continue to promote the GAIN concept within the FAA, as a successful industry effort to globalize a safety information database will be a significant contribution to the goals of the ATOS/SPAS program.

Flight Deck Human Factors

After extended discussion, we concluded that the efforts of the FAA and the ATA airlines to implement the Flight Operations Quality Assurance (FOQA) and Advanced Qualifications (AQP) programs should continue into FY 2001 and beyond. Individual Airlines have been investing in the implementation of these programs and we believe that the potential for flight deck errors will be reduced as these programs are implemented. Data seem to indicate that the FOQA programs implemented in Europe many years ago have had a statistically significant impact for European Carriers.

Aircraft Evacuation

The understanding of the problems surrounding the evacuation of an aircraft after an accident occurs continues to stimulate debate in the SAS. A very dramatic demonstration of the problems encountered by passengers attempting to evacuate a smoke filled aircraft was given to the committee at CAMI. We have yet to reach a consensus in the SAS about the need to build a flexible cabin simulator at CAMI. Although the computer technology exists to simulate conditions encountered in an emergency evacuation, the sponsors of the request for funds to build this cabin simulator insist that the computer models employed today are not capable of duplicating the actual responses of passengers in an emergency situation. The need exists to better understand the dynamics of evacuation, particularly in the wide body and future "jumbo" wide body aircraft types. We will continue discussion of this project in our meetings in February of 1999.

Conclusion

The SAS recommends that the FAA continue to concentrate R,E&D efforts in FY 2001 and beyond on the issues arising from aging aircraft fleets. New technology aircraft will exhibit different problems as they age. In conjunction with advancing inspection and maintenance technologies, the FAA must continue to develop the safety database and related analyses techniques that will generate leading indicators of potential safety problems. The feedback from this analysis must be incorporated into operating regulations and certification standards in a timely manner so as to prevent new accident modes.

Attachment 4 (Continued)

Recommendations for FY 2001

Chairman: Dr. Dennis McLaughlin (Acting)

Subcommittee on Security

After careful review, the Security RPD panel believes that the security R&D projects are pertinent to the Federal Aviation Administration's (FAA) mission. The goals are clear, quantified, and appropriate.

In terms of the project mix, the Subcommittee recommends that no projects be eliminated. However, panel members would like to see more emphasis on: systems analysis; a broader architectural view; systems integration, and hardening of

narrow body aircraft.

The Subcommittee also believes that the program can be strengthened through increased partnerships with the aviation community. Significant partnerships already exist with other government agencies, academic institutions, and international aviation groups. Greater involvement with industry is recommended.

The FAA Aviation Security Program R&D Designated Federal Official to the Subcommittee is Lyle Malotky. The FAA's response to Subcommittee guidance was appropriate and the Subcommittee has no additional guidance for the FAA.

During past briefings, members of the R,E&D Advisory Committee have suggested that consideration be given to downsizing the well-funded security R&D so that funds could be used for more critical safety R&D projects. The Security Subcommittee believes that any such decisions at this time would be premature. The FAA security staff have been coordinating the integration of a large number of luggage scanning systems (the use x-ray tomography) in major airports in the U.S. The R,E&D Advisory Committee would like to receive an assessment of the effectiveness (and problems) that have been demonstrated by these installations. It is recommended that FAA's Security Equipment Integrated Product Team (IPT) first present a detailed review to the Security Subcommittee who in turn will report to the REDAS at next January's meeting. Specifically the Subcommittee would like to know the status of equipment purchases and deployments; airline and airport contributions to the IPT; and an evaluation of how effective the equipment deployments have been.

In terms of the RPD process, the Subcommittee recommends that the RPDs should be limited to two succinct pages. The RPD emphasis should be on performance goals. In other words, the RPDs need to be aligned with the performance goals. The Subcommittee also would like the RPDs to identify technical risks. The Subcommittee understands that cost benefit analysis for security is difficult, but would like to see the FAA attempt to baseline the program through some type of cost benefit analysis.

Attachment 4 (Continued)

Recommendations for FY 2001

Chairman: Dr. John Lauber

Subcommittee on Human Factors

The following represents the Subcommittee's recommendations for the FAA's FY 2001 research program.

- The agency should ensure that Human Factors R,E&D dollars, especially Air Traffic Human Factors, are spent on appropriate R,E&D activities. While the efforts to resolve human factors issues with STARS should be commended, clearly most of these efforts were related to R&D rather than R,E&D. Further, Air Traffic R,E&D activities were delayed as a result. Last year at this time we recommended that the FAA needed to conduct more human factors research in the Air Traffic area and we still believe that recommendation is valid.
- The agency should support the proposed changes to guidance in the Acquisition Management System and to the FAA integrated Capability Maturity Model. These changes go a long way in responding to the recommendations made by numerous reports over the past decade (e.g., GAO, REDAC, and NRC). The changes in guidance -- coupled with a corresponding allocation of people and dollars from both the R,E&D and F&D budgets - would indicate to us that a commitment is being made to meet those long-standing recommendations.
- The agency should examine the efficacy of managing the Maintenance Human Factors program out of Aviation Medicine rather than Human Factors. It appears to the Subcommittee that this arrangement - while founded in tradition - has led to multiple levels of management, and responsibility without authority for the Office of the Chief Scientist. It would seem logical to have Human Factors specialists in

AAR-100 who have strong connections to other HF researchers, expertise, and industry, manage this program. This lack of connectivity in the current maintenance human factors program management structure should be remedied.

- The agency should continue the success that has been gained through the implementation of the human factors web-based Research Management System. This technology will support the AVR-AAR research requirements process, currently being developed. We believe the efforts to establish a requirements process and to design a critical support infrastructure are essential to improving the FAA's R&D program. The Human Factors Subcommittee saw a demonstration of the early version of the Research Management Systems last fall and is pleased that this technology is being matured. This technology will provide not only the critical support infrastructure (storage and retrieval), but allow wider and quicker access to corporate knowledge.

Attachment 4 (Continued)

Recommendations for FY 2001

Chairman: Dr. Wesley Harris

Subcommittee on Environment and Energy

The FAA must provide strong leadership in mitigating aviation's adverse impact on the public consistent with an affordable, efficient, and safe aviation system. From an environmental perspective, the FAA must place more emphasis on meeting its environmental mandates and fully understand the national and international ramifications of environmental impact on the health of aviation industry. Current FAA environmental research is a limited effort which, if not strengthened adequately within the agency, will eventually restrict the growth of the aviation system. An increased level of focused strategic research is needed to (1) advance abatement technology, (2) identify appropriate environmental standards, and (3) develop environmental assessment computer models. To provide a minimally effective environmental research program, the FAA must include the following in its FY 2001 research portfolio:

I. Increased environmental assessment capability

A. Model development for mandated requirements

1. Noise impact outside airports

- a. Enroute (NEPA requirements)
- b. National parks and Wilderness areas (US Congress requirement)

1. Emissions

- a. Below 3000 feet (NEPA requirement)
- b. Enroute (NEPA requirement)

A. Engine emission certification

II. Continuation of current joint FAA-NASA environmental research

A. Current joint FAA-NASA noise research program ends in 2001. Follow on

Program with goals, objectives, and metrics must be developed and formalized in current budget cycle.

- B. Current joint FAA-NASA emissions program needs further refinement to include near term research for reducing greenhouse and NOx emitted from current production engines.

Research portfolio item I.B has the highest priority. Item I.A has the second highest priority. The quintessential joint FAA-NASA environment research program is the nations' foundation for aviation environmental assessment, certification, and modeling and is therefore highly recommended for continuation in FY 2001 and beyond.